



Joint-AC Advice on valorisation of fisheries and aquaculture by-products

AAC/MAC/NSAC/CCRUP 2024-9

September 2024



The NSAC, MAC, AAC and CCRUP gratefully acknowledge EU funding support



NSAC
North Sea Advisory Council



MAC
Market Advisory Council



CCRUP
COMMON CROSS-REGIONAL UNION OF PRODUCERS
CONSEIL COMMUNAL POUR LES PRODUCTEURS D'AQUACULTURE
CONSELHO COMUM DOS PRODUTORES DA AQUICULTURA

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1. Background

This paper was inspired by the [policy event](#) 'Connecting the dots for a circular blue economy - from science to policy and regulatory solutions' hosted by MEP Clara Aguilera at the European Parliament, and organised and funded by the Blue Bioeconomy ERA-NET Cofund ([BlueBio](#)) on 30 January 2024. The objective of the BlueBio is to identify new and improve existing ways of bringing bio-based aquatic products and services to the market, focusing on all the links of the value chain from resource management and biomass producers, to supply systems and market. Many of the BlueBio-funded R&D projects have concluded that regulatory obstacles exist, limiting further innovation, investment, and/or development of European fisheries and aquaculture sectors. While there is a lot of potential to transform the sectors into more sustainable and circular ones, further work, development, and enhanced cooperation at European level is needed. Four of the European Union (EU) Advisory Councils (North Sea AC, Market AC, Aquaculture AC, and Outermost regions AC) have recognised this and undertaken to provide policy recommendations on the topic with the experience and expertise of its stakeholders.

On previous occasions, AC recommendations have already been submitted regarding fisheries and aquaculture side streams and waste. See, for example, the recommendations on landing of fish below Minimum Conservation Reference Size in the [MAC advice on the landing obligation](#), the [AAC advice on the legal classification of farmed fish waste as manure](#), and the [CCRUP advice on the valorisation of fishing by-products from the Outermost Regions \(ORs\)](#).

The present paper aims to build upon these and provide policymakers with a detailed description of the issues faced by fisheries and aquaculture sectors in the blue bioeconomy, as well as to highlight any health, safety, and sustainability concerns for humans, fish, and ecosystems in general.

Through case studies, we aim to draw attention to existing regulatory bottlenecks to encourage discussion and rethinking of valorisation processes of fisheries and aquaculture leftovers and byproducts in the EU, from research and innovation to the market. Bringing the EU's Blue BioEconomy to full circularity and zero waste will bring the EU on par with some of the most advanced marine economies, whose fisheries and aquaculture sectors are central to their economies (see, for example, Icelandic [100% fish](#)). It will also constitute additional revenue sources for fish and aquaculture products producers. At this point in time, the EU still lacks an integrated and holistic approach pertaining to the extraction and use of fisheries and aquaculture resources, which are currently dealt with in silo.

2. Case studies

2.1. [BlueBioChain: Identifying Regulatory and Social Hurdles in Turning Wastewater into Valuable Products with Microalgae](#)

The objective of the BlueBioChain project is valorisation of wastewater from food industries and aquaculture farms with microalgae to generate high market value products such as cosmeceuticals, food colouring agents and aquaculture feed. The barriers identified during the project's course are linked to the absence of regulatory standards leading to lack of clarity and predictability for further investment. There are challenges facing the use of food processing wastewater to ensure the production of safe end-products assisted by traceability control, with data needed to ensure safety.

During the BlueBioChain project, a survey has been conducted regarding the social acceptance and perception of this project. The survey showed that there was a high awareness of the project's subject (85% for wastewater use and 75% for microalgae use) and an overwhelmingly positive perception regarding the use of wastewater and microalgae for bio-based products. The survey further outlined that consumers show varying levels of willingness to purchase different types of bio-based products:

- Cosmeceuticals: 63% in favour; 11% opposition;
- Food additives: 56% in favour; 20% opposition; and
- Fish: 52% in favour and 19% against.

While consumers are generally reluctant to pay a premium price for food additives and fish, they are more willing to pay a premium for cosmeceuticals.

Some key points identified in respect of regulatory barriers were:

- a) Safety and Toxicity concerns
- b) Quality and Purity standards
- c) Environmental Regulations
- d) Approval and Certification processes
- e) Labelling and Marketing regulations
- f) Traceability and Supply Chain Oversight
- g) International Trade & Compliance

2.2. MariGreen: Barriers in the valorization of BLUE residues for the production of fertilisers and biostimulants

The objective of the MariGreen project is to upgrade poorly used residual materials from the blue value chain (i.e. from fish capture, organic aquaculture and the seaweed industry), by applying several appropriate technologies to produce fertilisers and biostimulants useful for green agriculture. Fish processing wastes and aquaculture sludge are both rich in nutrients and offer valuable potential as inputs in agriculture as fertilisers and biostimulants. However, their use is currently not permitted by the EU since, for instance, fish excreta are not considered animal by-products under the Animal By-Product Regulation (2009/1069, art. 3.20). Moreover, for fertilisers to be applied in organic growing, there is currently no regulation on acceptable additives and processing methods. Collaboration between decision-makers, research community and industry units is essential to develop appropriate strategies to support the adoption of these new organic fertilisers and biostimulants.

2.3. AquaHealth: Bioactive compounds from microalgae microbiomes for sustainable health management in aquaculture

The AquaHealth consortium aims to identify novel biofilm-inhibiting and antimicrobial enzymes, as well as antiviral candidates derived from microalgae. The project has a great potential in relation to reducing waste, providing feed and disease treatment solutions with a lower environmental impact and higher carbon sequestration. Less complex and harmonized procedures and standards are suggested to valorise these functions. Currently, if mixed algal biomass is grown, authorisation is difficult in product regulations which are based on individual algae species. Overall, project's key findings were:

- Microalgae biomass, supernatants and extracts showed antimicrobial and antiviral effects against fish pathogens;
- The project contributed to a potential reduction of environmental impact from finfish aquaculture by more than 5%;
- Dienelactone hydrolysate proteins (e.g. Dlh₃) exhibit significant biofilm inhibition effects.

3. Facilitating the circularity of aquaculture feed

Fish sludge are faeces from the production of farmed fish, consisting also of undigested excess feed, and collected from closed on-land aquaculture systems. It is a product suitable to be used as fertiliser and authorised in some countries, such as Norway. However, the use of sludge as fertiliser is excluded from the EU Fertilising Products Regulation (EU) No. 2019/1009. In light of this, fish producers face a major regulatory barrier as they can choose to either follow national regulations, the EU regulatory framework or follow the principle of Mutual Recognition outlined in Regulation (EU) No. 2019/515.

Fish sludge is not on the list of component materials and therefore not allowed to be used as fertiliser under the EU fertilising products Regulation (EU) No. 2019/1009. It is also not covered by the Animal By-product Regulation since excrements and/or urine of farmed fish is not included in the definition of manure (Regulation (EU) Nr. 1069/2009, art. 2 (k) and art. 3, nr. 20). The current challenges in recycling of fish sludge for use in agriculture include food-chain and environmental safety issues such as heavy metals as their levels need to be controlled. Other issues include organic pollutants (such as plant protection chemicals and pharmaceuticals) and the sufficient understanding of risk in relation to food safety and the environment.

Hygiene is another important issue that needs to be tackled as there is a need for knowledge regarding possible processing methods that secure good hygiene and prevent the spread of infectious agents. Lastly, to be used as a fertiliser, the products must have physical properties that allow them to be transported to where the nutrients are needed in agriculture. This entails that sludge has to have good storage and spreading properties, little smell, and low to moderate salt content. A fertiliser must also contain available nutrients and a balance between nutrients that fits the crops needs.

Another viable alternative for fish sludge as part of the circular economy, is to be used as feed for insect farming. However, this poses the risk of recirculating pathogens and contaminants. This is the reason why this route is currently excluded by the EU feed regulations and requires more research regarding safety measures. Farmed insects fall within the category of farmed animals according to the EU Regulatory Framework. Consequently, insects may only be fed with material edible for farmed animals. Hence, the use of fish sludge is prohibited to produce and/or feed these types of animals, as it is not allowed to use faeces, urine, and content from the digestive tract, "irrespective of any form of treatment or mixture".

Generally, feed may only be placed on the market and used if:

- it is safe; meaning there are no adverse effects on human or animal health or make the food derived from food-producing animals unsafe for human consumption;
- It does not have a direct adverse effect on the environment or animal welfare (ex. covers the nutritional requirements).

To change the status quo, three elements are needed:

- New scientific knowledge on safety and health features;
- The new data is risk-assessed by the European Food Safety Authority (EFSA);
- Political will to change the legislation.

4. Circularity of fisheries side streams and waste

Fishmeal and fish oil are produced mainly from small, short-lived fish, as well as recycled trimmings from fish processing for human consumption. The most important fish species are capelin, sand eel, blue whiting, sprat, and Norway pout.¹ A growing amount of raw material comes from recycled trimmings. The fillet yield for most fish species varies between 30% and 65% of the mass of the fish², and the cutoffs constitute a valuable resource for marine ingredients producers. The use of cut offs has increased significantly over the last few years and today, in the case of the European Fishmeal and Fish Oil Producers (EFFOP), members use around 40% of cut offs³, with some plants only processing trimmings to produce fish oil and fish meal.

The industry in the European Union is leading in optimizing the exploitation of valuable marine resources, contributing to the circularity of the blue economy, and reducing the environmental footprint of fisheries and aquaculture production. To produce fish oil for human consumption, producers need to process food grade raw materials in food grade plants, following food safety regulation requirements. However, EU plants face a significant challenge in pursuing the production of fish oil for food due to the necessary co-existence of animal by-product materials processed within the same establishment. Such integration is pivotal for enhancing industry efficiency and making the best value of raw materials. Certain fishery products, and in particular cut offs from the processing industry, could be classified as animal by-products, and once declared animal by-product, such raw materials cannot be upgraded and processed for food markets. Mixing different raw materials, approved for food or for feed, is not permitted either. While the importance of adhering to strict hygiene measures and ensuring that facilities meet food-grade standards to produce fish oil for human consumption is recognized, it seems insensible that a large proportion of raw materials cannot be valued in food markets. There is a need for more flexibility in regulations, to address the need for adaptability in the industry. Particularly when current industrial processes, logistics and appropriate hygiene rules can ensure the safety and freshness of these materials, and avoid cross-contamination.

5. Advice

The EU fisheries and aquaculture sectors have a particular role to play in contributing to the transition to sustainable food system and the development of the bioeconomy and circular economy. Today, 40% of fish meal used in aquaculture feed originates from marine food production leftovers and over half of the ingredients used are by-products of marine, vegetable, and animal origin. This aims to limit the sectors reliance on fish meal and fish oil from wild stocks. The sectors are also leading in terms of technological development and innovation along the value chain, putting the EU at a competitive

¹ <https://effop.org/resources/responsibility/>

² Einarsson, M. I., Jokumsen, A., Bæk, A. M., Jacobsen, C., Pedersen, S. A., Samuelsen, T. A., Pálsson, J., Eliassen, O., & Flesland, O. (2019). Nordic Centre of Excellence Network in Fishmeal and Fish oil. *Matis. Matis Vol. 06-19 No. 62477*

³ [EFFOP Policy Paper \(January 2024\)](#)

advantage in terms of RTDI transfer. It is essential that the regulatory framework provides both safety and flexibility to allow innovation to support a sustainable and ambitious growth of the industry. Market policies and promotions campaigns of aquatic products are also essential.

Our **advice** to the European Commission is as follows:

- We welcome a **foresight approach**, undertaken by the European Commission, ensuring that EU policy and regulation anticipates future societal and technological developments, and ensures high levels of safety and consumer confidence.
- There is a need for **sound scientific advice** (where appropriate, to be delivered by EFSA) to support modifications to existing legislative framework.
- Determine **acceptable additives and processing methods** in organic farming so as to provide clarity on the use and composition of **organic fertilisers** and provide a further incentive for the “substantial growth” organic aquaculture called for by the Farm to Fork Strategy.
- Consider developing **operational scenarios** enabling EU producers to make the most of aquatic resources, providing food and feed sectors with high-value products, while ensuring full compliance with the Union legislation. There is a need to revisit the 2009 **Animal By-Product Regulation** to align with the principles of the **circular economy** and food sustainability, without compromising safety standards in the current landscape. The new version should categorise fish excreta as manure and make them suitable for use as fertiliser.
- Promoting **collaboration between decision-makers, research community and industry** units is essential to develop appropriate strategies to support this transition.
- In some cases, there are other options to **address regulatory obstacles** other than amending legislation. The Commission should consider exploring those options on a case-by-case basis.
- **Harmonisation in feed regulations** across EU member states is advisable to facilitate market entry.

More **general recommendations** to the European Commission and the Member States on the circularity of fish and aquaculture products are that:

- The EU should facilitate **funding of universities, start-ups, and SMEs** engaged in research and innovation into the sustainability of the fisheries and aquaculture sectors.
- **Communication/knowledge exchange** between scientific and regulatory fields should be improved and fostered through appropriate funding, incentives and platforms for these exchanges, ensuring that scientific findings are quickly and effectively translated to policy solutions.
- **Enhanced coordination and cooperation** are needed between the EU and national directorates, and between researchers, industry, and regulators. The circular blue economy should be gradually and systematically upscaled – in terms of size and dedicated funding.
- **Enhanced coordination** between DG MARE and other relevant services, particularly DG SANTE, is advised, particularly in the framework of the Farm to Fork Strategy.
- **Continuous and systematic engagement** of Commission services with the relevant **Advisory Councils** is crucial for ensuring that proposed policies or amendments are in line with

stakeholders' perceptions of reality in the sectors. **High-level policy events** with appropriate stakeholder involvement are beneficial as well. The earlier in the process this engagement is initiated the better the on-ground expertise can be incorporated in policy proposals, ultimately enhancing their salience and legitimacy.

- The Commission and Member States should support **the local SMEs** companies in improving their sustainability, contributing the reduction of carbon footprint and promotion of the blue bioeconomy.
- The Commission and Member States should continue to encourage and facilitate EU processing companies in research and development of valorisation of byproducts.

It is also important to keep in mind ongoing work by the [European Sustainable Phosphorus Platform](#) concerning amendments to EU legislation to facilitate the valorisation of by-products, including ongoing exchanges with Commission services.

6. Conclusion

The Advisory Councils would like to thank the Commission and relevant Member States for considering the above recommendations. In case of questions or comments, please reach out to our Secretariats. We remain open to further engagement with relevant units.



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